The Spokesman

OFFICIAL PUBLICATION

NATIONAL LUBRICATING GREASE INST. NLGI

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4. **Impervious to water**—excellent resistance to washing out.
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Volume XIV Number 3

ABOUT THE COVER

The Precision-Shell Surface Area Apparatus is designed to facilitate the determination of the surface area of powdered or granular, porous or non-porus, materials according to the method described in the literature by Brunauer, Emmet, and Teller, using low temperature adsorption of nitrogen gas, or the adsorption of other gases such as butane at appropriate temperatures, or by the method described by Harkins and Jura. This apparatus can likewise be used for the determination of particle size of non-porus materials and for the evaluation of porosity, and hence apparent density, of certain types of porous materials.

A knowledge of the extent of the surface is of considerable value in numerous technological fields. In the paint industry, surface area and particle size of pigments is being investigated; in the rubber industry, surface area and particle size of filler materials and of reinforcing agents have been studied; much interest has been displayed in the influence of these properties on the behavior and evaluation of bone chars, filter clays, and decolorizing agents in sugar refining and for the clarification of oils and fats.

In the field of catalysts, the determination of surface area and particle size has been of very great value both in evaluating new catalysts, and in following the decline in activity of catalysts during commercial operation; in some instances the activity of catalysts may be directly related to the extent of surface, and it is generally accepted that the extent of surface is highly significant in most catalytic problems.

(*Continued on Page 21*)

President's page

by Arthur J. Daniel, President, N.L.G.I.

"TAXULATION"

All of us are familiar with the adage . . . "Nothing is certain in life except death and taxes". Modern medicine has succeeded in lowering our death rate . . . but modern government has done little to lower taxes. More and more taxes are being levied every day and it is costing American Business more and more to remain alive. This high cost of "business living" has reached a stage where something must be done if the American Business System is to survive.

THE MEAT IN THE ECONOMIC SANDWICH

Labor organizations throughout the country have used the rising cost of personal living as the basis for their wage and salary demands on business enterprises. Increased taxes levied on business have formed the other side of this "sandwich" and business has found itself in the middle of a gigantic "double-squeeze play". The end results of this situation are all too clear . . . increased pressure in the form of taxes is rapidly accelerating our economic system into a state of socialization.

LET'S FACE THE FACTS

Let us face the fact that taxes are necessary for government to exist; but, let us also face the fact that discriminatory taxation against any one group will, in the end, affect all of the people through changes in our economic structure. Penalties in the form of excessive taxation should not be the reward of private or corporate ownership; for, if taxes are to remove all gain from business enterprise, our American economic structure will surely pass into decay.

A ONE-SIDED STORY

At the present time, there is a great deal of publicity informing the public that high taxes play a large part in the rising cost of their personal living expenditures. Whether or not we agree with the political aspects of this publicity, we will all agree that the public is entitled to full information concerning the taxes assessed upon them; but, what about the other side of the picture . . . the effect that excessive business taxes will have on the life of the individual? This appears to be one of the vital facts that is missing from this public education program.

THE IMPORTANT "1 OUT OF 7"

How can these facts concerning the business taxation problem be placed before the public? I am told that "1 out of 7" employed persons in our nation are engaged in occupations connected with the petroleum industry. Here is a large cross section of our nation's people and it is to this group that we, as members of the petroleum industry, can most easily present our problem; for, if these citizens can be made to realize that excessive taxes on business are a direct burden on themselves as individuals, we will have gone far toward reducing the tax burden. "Taxulation", the economic disease that is strangling American Business, must be halted if our American way of life is to continue. It's time to bring concentrated effort to bear on the problem of lowering taxes. Let's present the facts to the people of our industry and help them lead the way for others to follow.

Performance OF SILICONE GREASES

by C. C. Currie,
Dow-Corning Corporation

THE TREND toward increasingly high and low operating temperatures has created a difficult problem for bearing manufacturers and for lubrication engineers.

This problem has been partially solved by the introduction of various synthetic lubricants including such organic greases as the polyoxalkylenes and diesters and the semi-inorganic silicone greases. Because of their relative indifference to changes in temperature[1], the silicone greases would seem to be singularly well adapted to service in bearings operating at temperatures above and below the limits of organic greases and over a temperature span much greater than that covered by any single organic grease.

(PERFORMANCES OF SILICONE GREASES)

The usefulness of silicone greases in bearings operating at extremely high and low temperatures has been established by laboratory testing[2] and by performance under actual service conditions. Some of the results obtained with these greases in various industrial applications are reported in this paper. While all of the operating conditions are not available, a brief review of the performance data that has been assembled

[1]Merker, R. L. and Zisman, W. A., *Ind. Eng. Chem. 41*, 2546-2551 (1949)

[2]Javitz, A. E., Electrical Mfg. 110-115, 190, June 1949

TABLE I

PHYSICAL PROPERTIES OF SILICONE GREASES AND SUMMARY OF APPLICATION DATA

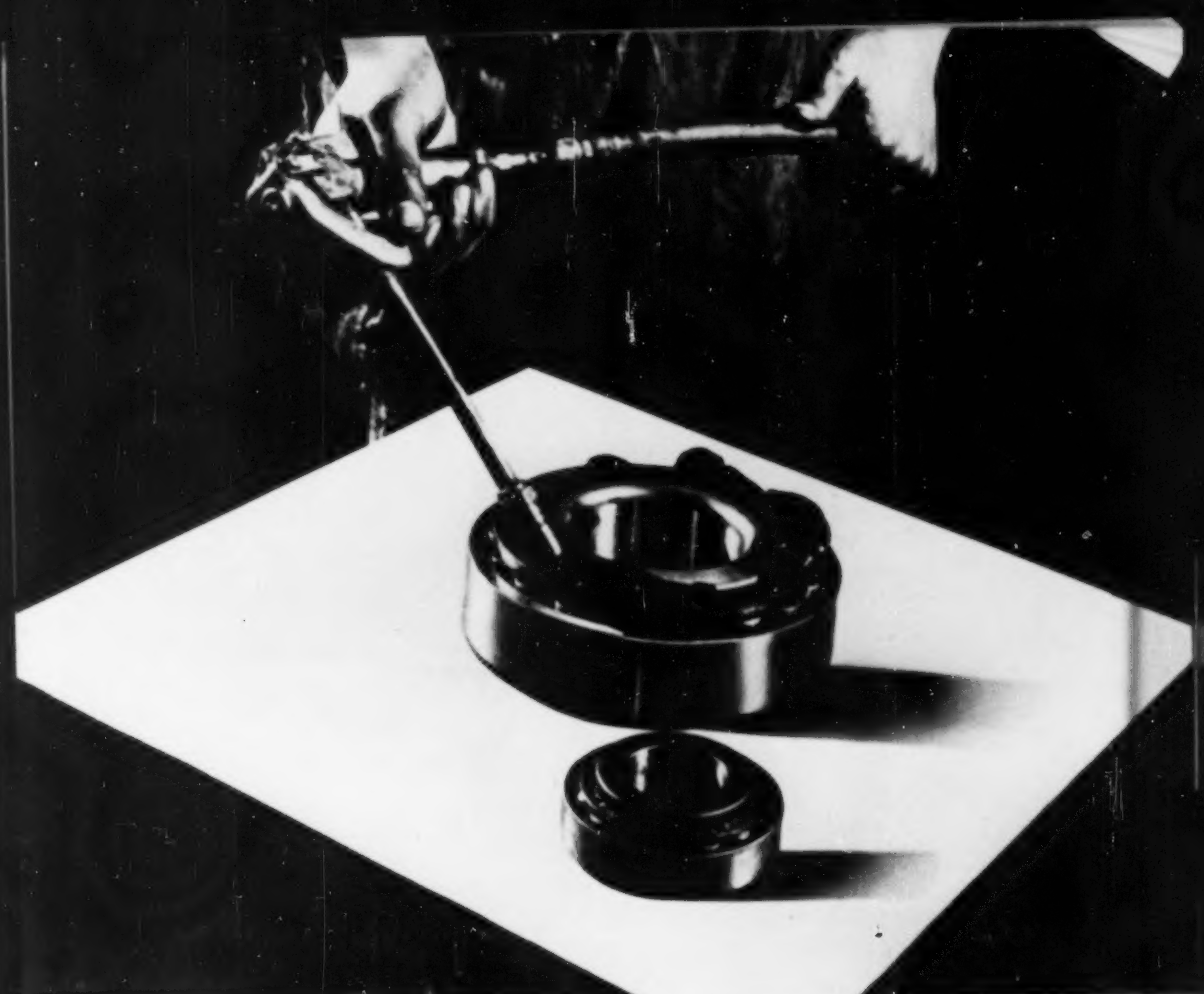
	A	B	C	D
Color	Black	Grey	Brown	Translucent
Penetration[1]	260-300	250-270	250-270	
Solidification Point,[2] °F., less than	—30	—100	—45	—50
Melting Point,[3] °F., more than	none	400	415	none
Maximum Bleed,[4] %				
at 230°F.	3.0	2.0	1.0	—
at 400°F.	6.0	3.0	2.0	7.0
Applications	Conveyor trolleys, oven bearings, and other slow moving equipment operating at 200° to 500°F.	Antifriction bearings exposed to very low temperatures or in services where minimum change in torque over a wide temperature span is required.	As a permanent lubricant for sealed ball bearings or in antifriction bearings exposed to high temperatures.	Plug valves and pumps operating at high or low temperatures in contact with various corrosive chemicals or steam.

[1]Penetration, ASTM D217-48 worked.

[2]Solidification points were determined by cooling samples of the grease with dry ice until the grease became a solid.

[3]Melting point determined on a magnesium bar with a cartridge heater fitted into a drilled hole at one end. A strip of grease is extruded onto the bar and a thermocouple is then used to determine the temperature of the bar at the point where the grease melts.

[4]Values determined with equipment specified in AN-G-3a. Samples held at indicated temperatures for 24 hours.



7200 of these trolley bearings are lubricated with Silicone Grease to withstand 700°F. in Ford Core Oven Conveyor System.

during the past few years will indicate some of the limitations as well as the advantages of these silicone greases.

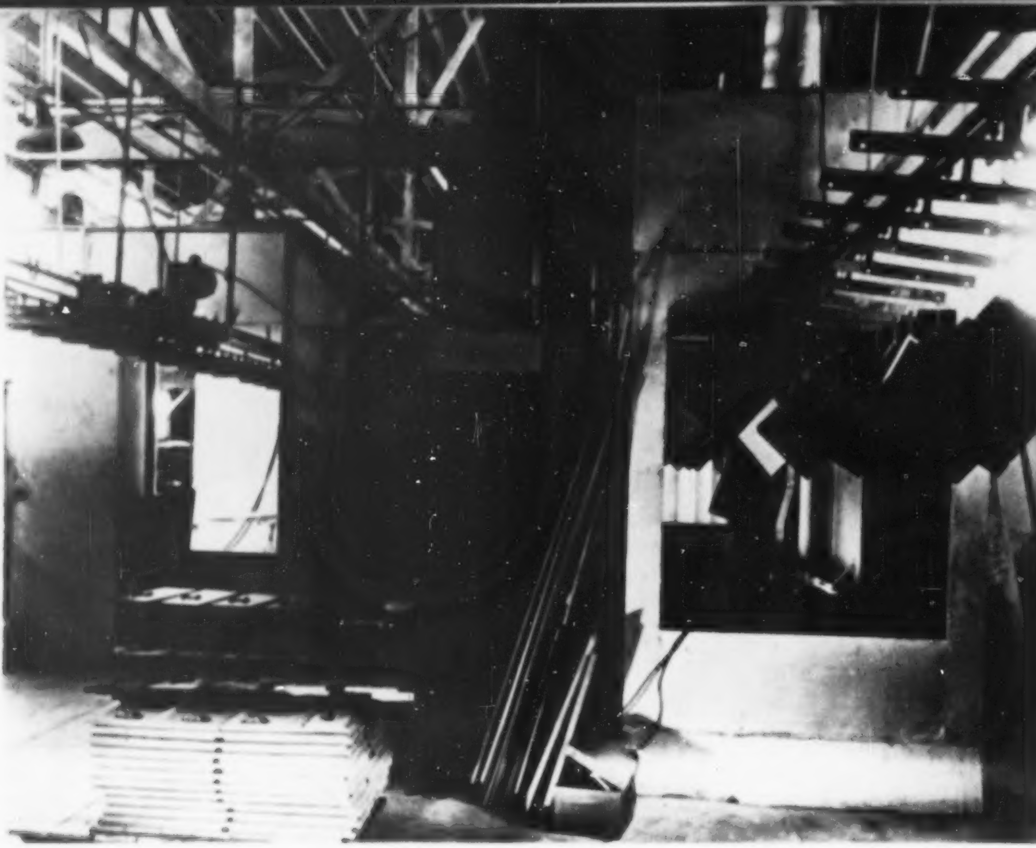
There are four silicone greases now available in commercial quantity. A brief description of these four greases and their fields of major usefulness are given in Table 1.

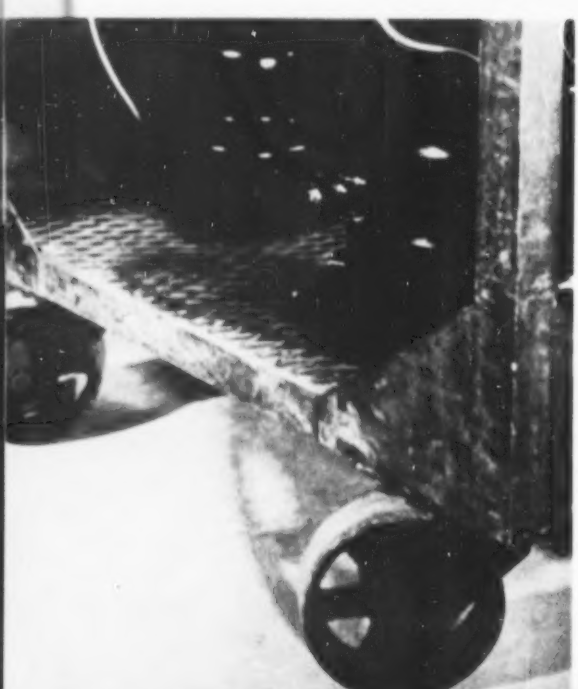
Silicone grease A contains a very heat-stable silicone fluid thickened with a special grade of finely divided carbon. It is designed for the lubrication of conveyor systems and similar slow moving equipment operating at extremely high temperatures. Silicone grease B is designed for use in ball and roller bearings operating at temperatures ranging from —100° to 300°F. It is a soap base grease prepared from a heat-stable silicone oil with a very low freezing point. Silicone grease C is designed for the permanent lubrication of high speed high temperature ball bearings. Silicone grease D is used to lubricate valves and packings exposed to a variety of corrosive materials at high and low temperatures. It is a translucent grease prepared from a silicone oil and thickened with silica.

SILICONE GREASE IN ANTIFRICTION BEARINGS OPERATING AT VERY HIGH TEMPERATURES AND LOW SPEEDS

Grease A is the most heat-stable of the silicone greases. It is widely used as a lubricant for oven conveyor bearings because of its extraordinary heat resistance and non-melting characteristics[1]. This grease is most effective in slow moving equipment but it has been successfully applied to anti-friction bearings operating at speeds up to 2000 r.p.m.

Experience shows that continuous exposure to temperatures in the range of 375°F. has little effect on the properties of this grease. Prolonged use at temperatures above 375°F. will cause eventual thickening and will necessitate relubrication. Relubrication schedules for open type ball and roller bearings range from once a week to once every several weeks depending upon the operating temperatures and speeds and upon how corrosive the atmosphere may be. Sealed bearings packed with grease A are relubricated at intervals of one to





(Above) Bearings in conveyor system carrying freshly painted electrical equipment through oven at 375°F. require relubrication only twice a year with Silicone Grease.

(Left) Use of Silicone Grease eliminates sticking and frequent relubrication of oven cart caster bearings exposed to 325°F.

several weeks by introducing 2 to 3 drops of a special silicone fluid. After several oilings, fresh grease is added and the cycle is repeated.

[1]Currie, C. C., Lubrication Engineering, 4, 220-222 (1948)

For example, an automobile manufacturer was plagued with almost constant maintenance on a paint conveyor system carrying body parts through an oven at 450°F. In spite of all the lubricants and lubricating methods employed, the bearings became so stiff after the system was shut down for a day or two that the full power of the motor and the pulling power of 10 to 15 men were required to start the conveyor. Under such strain, the steel connecting links were frequently broken. The use of silicone grease A has eliminated bearing seizure, broken links and high power consumption. The bearings are simply relubricated once every three months with grease A and oiled once a month with the special silicone fluid.

An electrical manufacturing company was similarly troubled by bearing failure and grease dripping on freshly painted parts in an oven conveyor system operating at 375°F. Even with weekly relubrication, bearing failure was common. That difficulty was eliminated by cleaning the trolleys and packing them with grease A. These bearings are now relubricated only twice a year and there have been no bearing failures in more than two years of operation.

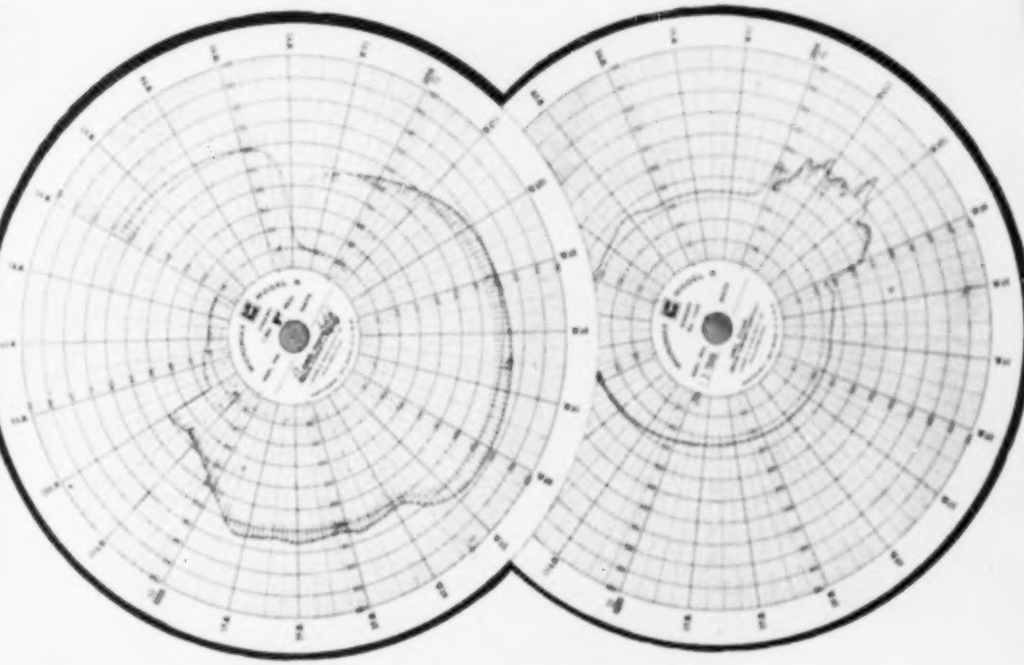
Grease A is also used to lubricate the roller bearing casters of oven carts that are loaded with 1000 to 2000 pounds of refrigerator units and wheeled into an oven for 4 hours at 325°F. This operation is repeated 4 or 5 times a day. The bearings which were previously relubricated as often as several times a week are now relubricated only once every two or three months.

Silicone grease A has been used for the past 2½ years to lubricate six core oven conveyor systems. Each conveyor unit includes about 120 trolley bearings and four, six inch roller bearings that are mounted in the ovens. These conveyor systems are operated for 16 hours a day, 5 days a week. They carry engine cylinder block and head cores through ovens in which the hottest spot temperature is 700°F. The conveyor speed is such that each bearing is in the oven for 2½ hours out of every 4 hours. The trolley bearings are relubricated once a week and the large roller bearings are lubricated once every two weeks with silicone grease A. Maintenance problems have been eliminated; labor costs have been reduced; and power consumption has been reduced by more than 80%.

These are only a few of the many applications in which silicone grease A has proved its usefulness. Others are summarized in Table II. This grease is most useful at high temperatures and in corrosive atmospheres. The usual temperature range for this silicone grease is from 300° to 500°F, although successful applications have been reported at 1100°F. Its principal advantages are: longer life at high temperatures; the elimination of contamination due to dripping grease; reduced maintenance costs and power consumption; and virtual freedom from expensive shut-downs due to bearing failure. Silicone grease A is most useful in relatively low speed ball and roller bearings; it has a limited usefulness in journals. It is not recommended as a lubricant for metal gears because it permits excessive wear under extreme pressure conditions. It has been used very successfully, however, as a lubricant for nylon and fiber gears.

TABLE II
SUMMARY OF APPLICATION DATA ON SILICONE GREASE A

APPLICATION	TEMP. °F	LUBRICATION SCHEDULE ORGANIC	SILICONE GREASE A
Paint conveyor system	350-500	daily	3 weeks
Paint conveyor system	400	biweekly	1 year
Oven carts		several times a week	2-3 months
Sanforizer	400	daily	3-4 months
Dollies handling canned food	250	continuous	entire canning season
Oven gears	450	twice daily	more than 6 weeks
Steam line valve	220-400	weekly	8-12 weeks
Oven bearings	700	not known	weekly



Silicone Valve Seal lubricates valves handling gases at normal operating temperatures of 225° to 725°C. as recorded by round chart at left. Chart at right records temperatures of 500° to 780°C. during 12 hour burn-off periods required once every 3 months.

SILICONE GREASE FOR SERVICE AT TEMPERATURES FROM —100° TO +300°F.

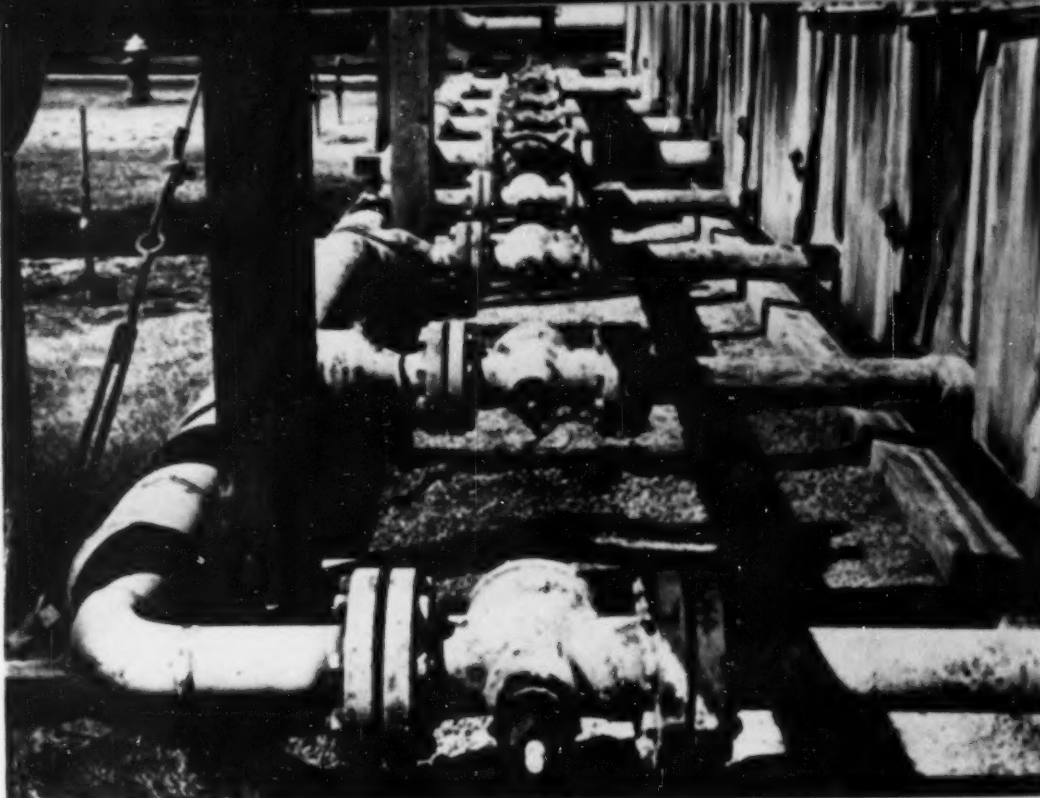
Silicone grease B is designed for use in ball and roller bearings operating at temperatures ranging from —100° to 300°F. Within that range bearings lubricated with this silicone grease show relatively little change in torque. A relatively low starting torque at very low temperatures is indicated by the fact that the plasticity number for this grease is only 2250 at —105°F. High resistance to centrifuging is indicated by the fact that it has been used successfully in small gyro bearings with inner races rotating at speeds as high as 70,000 r.p.m. It is produced in the four consistencies defined in Table III. The physical properties of the medium consistency grease are given in Table I.

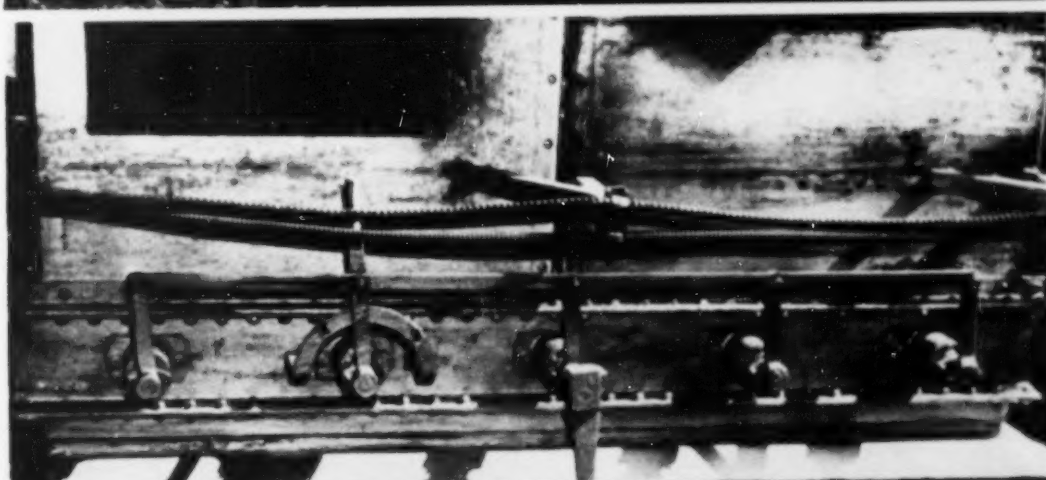
TABLE III

CONSISTENCIES AVAILABLE IN SILICONE GREASES

GREASE	CONSISTENCY	PENETRATION ASTM WORKED
B	Fluid	> 380
	Light	300-320
	Medium	250-270
	Heavy	200-220
C	Fluid	> 380
	Light	300-320
	Medium	250-270
	Heavy	200-220

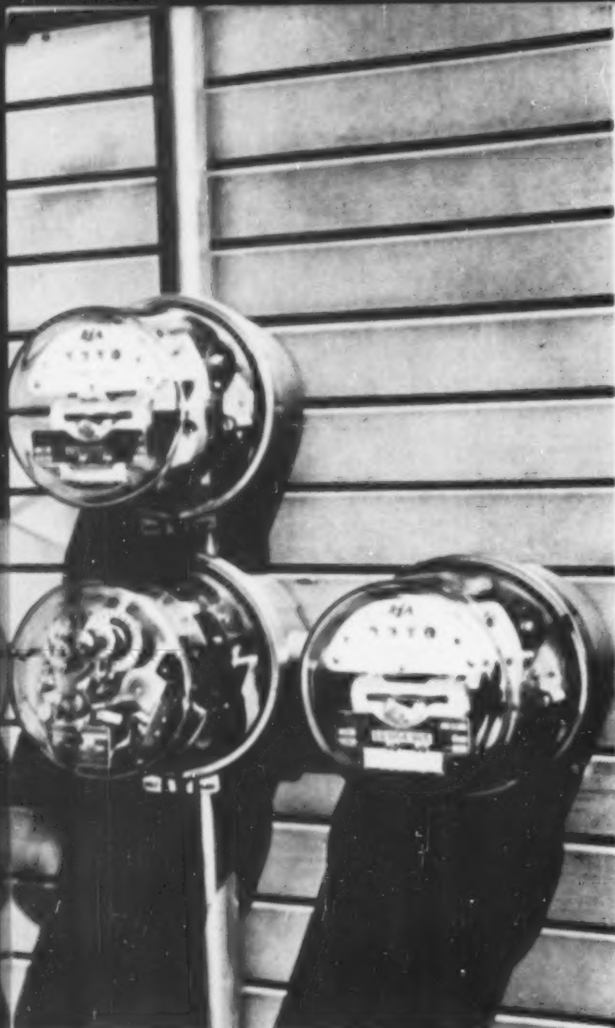
Silicone Grease in ball bearings on drying cans, operating at 400 r.p.m. around saturated steam journals, has 45 times the life of the organic grease previously used.



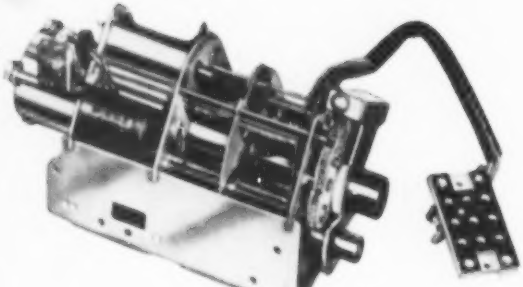


(Above) These four high pressure air valves (foreground) are lubricated with Silicone grease to give longer life and freedom from sticking.

(Below) Silicone lubricant has been used since 1945 to minimize corrosion and maintenance costs in bearings operated at 350°F. to 400°F. in these multi-vane type dampers.



(Above) Silicone Grease retains its consistency to permit timing motors in demand meters and time switches to operate at constant speed in spite of varying climatic conditions.



(Above) Silicone Grease permanently lubricates the plunger-solenoid contact surfaces in this Motorola Auto Radio pushbutton tuner.

Silicone grease B is used in greatest volume as a lubricant for photographic and optical equipment including camera lens mounts, take-up reels and focusing mechanisms, transit bearings, projectors and geophysical instruments. It is singularly well suited to such applications because it shows very little change in viscosity over a wide temperature range. The apparent viscosity of silicone grease B was determined in the SOD pressure viscometer at a shear rate of 20 reciprocal seconds at several temperatures. At 77°F. the apparent viscosity was found to be 325 poises. At —90°F. the apparent viscosity had increased to only 6000 poises.

In the electrical field, grease B is used in the bearings of clock mechanisms, time controllers, a radar tuning device, microphone switches and in the gears of X-Ray machines. It has been used successfully for more than three years as a lubricant for the bronze sleeve bearings of the small synchronous motors in demand meters and time switches. These motors must operate at constant speed in spite of varying climatic conditions. Use of silicone grease B helps to assure the accuracy of these devices whether they are installed in the North where temperatures may drop to —40°F. or in the South where internal temperatures may rise to 180°F.

SILICONE GREASE AS A PERMANENT LUBRICANT

The introduction of silicone (Class H) electrical insulation with a hottest spot temperature rating of 180°C. (356°F.) put a premium on the development of a heat-stable silicone grease for high temperature motor bearings.[1] Bearing temperatures as high as 300°F. are not uncommon in Class H motors built to give long service at temperatures 200°F. above the limits set for Class B motors[1].

Silicone grease, compounded of a heat-stable silicone oil and a lithium soap, was originally designed to meet the requirements imposed by silicone insulation. The physical properties of grease C, medium consistency, are given in Table I. It is available in the four consistencies defined in Table III.

This silicone grease is characterized by excellent stability at high temperatures and by superior resistance to oxidation and gumming over a temperature span of 490°F. from —40° to 350°F. It has been used successfully in ball bearings operating at speeds as high as 20,000 r.p.m. A top operating speed cannot be set definitely, however, because high speed performance is a function of bearing design as well as linear speed. Physical and chemical properties and performance data indicate that grease C is a good general purpose grease which can be used to make permanent lubrication a practical reality in many applications.

The stability of this silicone grease has been well established by its performance in textile mill equipment. For example, the relubrication schedule on fan motor bearings operating at 200-300 r.p.m. in a drier at 350°F. has been reduced from once a day to once in several months. In textile mill drying cans that operate on saturated steam journals at 400 r.p.m., silicone grease C has about 45 times the life of high temperature petroleum greases. One textile mill reports that there have been no drying can bearing failures since they started to use this silicone grease more than 30 months ago.

A radio manufacturer uses grease C as a lubricant and damping medium in a push-button tuner for automobile radios. The radio is tuned by a solenoid and plunger with a dash pot action between the two for smoother operation. Grease C was found by the user to maintain the correct damping action over a temperature range of —20 to 160°F. Service life testing was discontinued after 75,000 cycles had been run without any evidence of failure.

[1] Grant, G., Kauppi, T. A., Moses, G. L., Gibson, G. P., AIEE Technical Paper, 49-237.

"Cartridge" type ball bearings prelubricated with silicone grease C, light, are available from several of the leading bearing manufacturers. These bearings are usually identified by black metal shields. They are used and widely advertised to give 5 years of service without relubrication by one of the largest manufacturers of electric motors.

Both test and application data indicate that bearings properly designed and lubricated with grease C will give trouble-free service for the life of various instruments and household appliances such as refrigerator motors, washing machines, vacuum cleaners, electric razors, blower motors, oil burners and ventilating fans. The cost of permanently sealed bearings prelubricated for life may be more than offset by simpler mountings involving less costly machining. Even if conventional mountings and standard bearings are used, the cover plate can be sealed to the housing and the grease fittings can be plugged to eliminate the "man with the grease gun" and the attendent dangers of over-greasing and dirt contamination.

SILICONE GREASE DESIGNED FOR LUBRICATED VALVES

Silicone grease D is a translucent and colorless silicone grease developed as a lubricant for plug valves and flow meter bearings exposed to corrosive chemicals, high temperatures or both. Its physical properties are given in Table I.

The heat stability of this compound is demonstrated by its performance in four Stellite treated valves handling hydrocarbon gases at 200° to 500°C. (392° to 932°F.) for about 21 hours each day. During the remaining three hours, temperatures range from 500° to 700°C. (932° to 1292°F.) Three years of experience have proved that valves lubricated with this material need not be reground. Valve life has been tripled; the cleaning schedule has been reduced from once every 4 to 6 weeks to once every 6 to 8 months; and there is evidence that less expensive valves can be used.

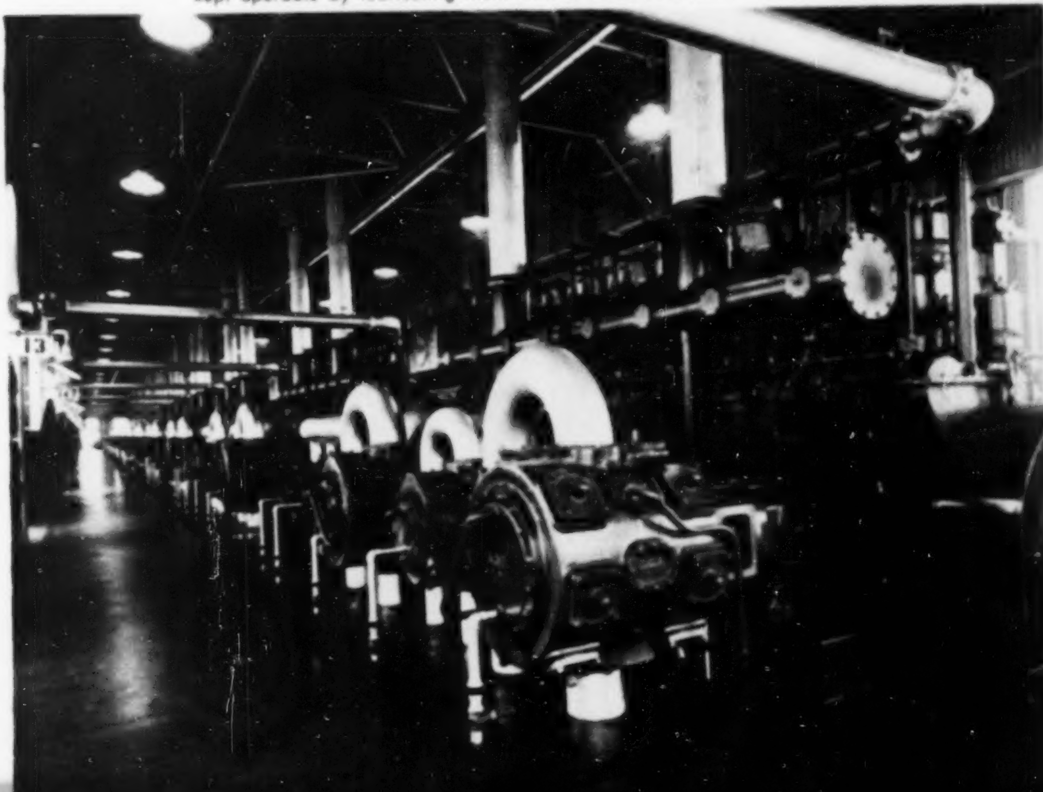
Grease D has been used effectively in valves handling such materials as acetic acid, acetone, methyl alcohol, isopropyl alcohol, formaldehyde, 93% sulfuric acid, furfural, phosphoric acid, carbon disulfide, hot water and steam. It is also used in the packing of pumps handling such corrosive materials as a sulfuric acid solution of ammonium sulfate. In such services, it reduces maintenance costs and reduces the hazard of frozen or inoperable valves and leaky pumps.

SUMMARY

All of these silicone greases are characterized by chemical inertness, thermal stability and relative indifference to extreme temperatures. Grease A is generally used as a lubricant for low speed, antifriction bearings in oven conveyor systems, pumps handling hot liquids, kiln carts and other equipment exposed to extremely high temperatures. Silicone grease B is most commonly used as a ball bearing lubricant in equipment where minimum change in consistency is required at temperatures ranging from —100° to 300°F. Silicone grease C has a wide field of usefulness as a permanent lubricant for sealed or cartridge type ball bearings operating at temperatures from —40° to 350°F. Grease D is used as a lubricant for plug valves, flow meter bearings and as a packing for pumps exposed to high temperatures, steam or corrosive chemicals.

These silicone greases are most useful in applications to which organic greases are unsuited because of their tendency to stiffen at low temperatures, to break down in corrosive atmospheres, or to bleed, evaporate and form gums at high temperatures.

(Below) the pressure lubricated valves on these 20 large air compressors are kept operable by lubricating them with a valve Seal Silicone lubricant.



GREASONALITIES

J. L. (JIM) CONSIDINE, JR.

Southwest Grease & Oil Co. is happy to announce the appointment of J. L. (Jim) Considine, Jr., as their Southern Sales Representative.

Jim brings to Southwest Grease seven years of experience in the lubricating grease industry, and is well known in oil compounder, refiner, and oil jobber circles in the Texas, Mid-South and Mid-Western regions.

He is a graduate of the University of Kansas City, and past president of its Alumni Association. While an undergraduate, his name was listed in Who's Who Among College Students. He is also past president of Alpha Eta Chapter of Alpha Phi Omega National Honorary Scouting Fraternity.

Mr. Considine currently lives in Kansas City, Kansas, and is a Vestryman of St. Michael's and All Angels Episcopal Church. His wife, Ann, is also a graduate of the University of Kansas City. They have three children—Lynn, age 8, James Corbin, age 4, and Jan Renee, 6 months.

Wesley G. Gish, Vice President of the Land and Exploration Division of Deep Rock Oil Corporation, is leaving the Company to enter the private practice of petroleum geology, it was announced in Tulsa today.

A graduate of the University of Nebraska, Gish has been active in oil exploration in the Mid-Continent and Gulf Coast states since 1921. He will continue to reside in Tulsa.

Mr. William B. Johnson has recently joined Precision Scientific Company to become their New York Representative. He will locate at 205 E. 43rd Street, New York City.

Mr. Johnson pursued undergraduate work in chemistry at Butler University after which he took graduate studies at Purdue University. Later he joined E. I. duPont as a research chemist in their Explosives Division, before going to the Fisher Scientific Company as a Technical Representative in the midwest area.

Mr. Johnson is a member of the A.C.S. and has served on the A.C.S. Council. During the war he was associated with the Oak Ridge Institute of Nuclear Studies.

WILLIAM B. JOHNSON

Promotion of three members of the supervisory staff at Deep Rock Oil Corporation's Cushing, Okla., refinery was announced in Tulsa today by W. J. Carthaus, Vice President, Manufacturing and Research Division.

Carlos C. Blount, former Assistant Chief Engineer, has been advanced to the position of Refinery Safety Engineer. This new assignment is in line with an expanded company policy of establishing safer methods, equipment and operations throughout the refinery.

Jon W. Beam, former Supervisor of Instruments, has been named Development and Instrument Engineer. This also is a new position created to help further the modernization program at the refinery.

Robert A. Forsman, former Refinery Maintenance Supervisor, has been appointed Assistant Chief Engineer to fill the position vacated by Mr. Blount.

THOMAS B. RICHEY, JR.

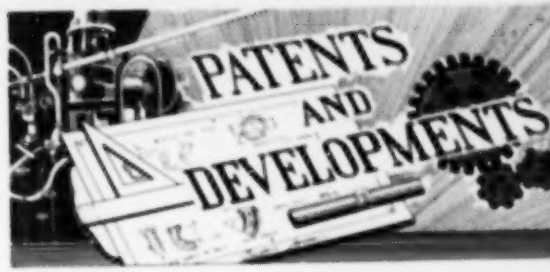
N. I. Malmstrom & Company announce the appointment of Mr. Thomas B. Richey, Jr., as Production Manager. Mr. Richey will be in charge of plant now being erected to manufacture new chemicals from wool grease, to be used in the oil, tanning and cosmetic industries.

Mr. Richey received his Chemical Engineering degree from Columbia University in 1939. He has been employed for the past ten years as Chemical Engineer in Production and Development of chemical processes for the Electro Chemicals Department of the duPont Company.

Vigorous N.L.G.I. President, A. J. Daniel (President of the Battenfeld Grease and Oil Corporation) has been making a record for himself in operating the N.L.G.I. during 1950. Not content with this unusual record of organization administration he has also distinguished himself on the golf course.

To be exact, it was Wednesday, May 10th, that he strode forth on an admittedly tough course accompanied by W. I. Lang (Crown Cork and Seal Co.), A. A. Sherwood (The Sherwood Co.), and N. M. Potts (Continental Can Co.). They reached hole No. 15, a 155-yard proposition with a par of 3 tacked to it. They had no more than reached the spot than President Daniel decided to demonstrate his real ability as a golfer and made a hole-in-1 before the awed and credulous audience. It is reliably reported that the onlookers are doing nicely in recovering from the shock of the occasion while Mr. Daniel contemplates his accomplishment as a routine proposition he indulges in daily—well, almost daily, anyhow.

Mr. Daniel posted 94, Lang 97, Sherwood 93, and Potts 99.



STABILIZED LITHIUM GREASES—A recent patent issued to the California Research Corp., describes the production of lithium base greases which are stabilized against deterioration by the addition of small amounts of polyvalent metal dithiocarbamates. The lithium soaps which can be used for this purpose can be salts or acids such as stearic, oleic, palmitic, acetic, butyric, ethyl butyric, ethyl hexoic, or caproic. While inhibition against oxidation of such greases is directed towards preventing hardening or softening or other effects, it is highly important that the inhibition be attained without adversely affecting desirable properties such as low and high temperature characteristics and water resistance.

Among inhibitors specified as suitable for this purpose are calcium and zinc dithiocarbamates in which hydrocarbon groups are present having 4-20 carbon atoms so that the salt is soluble in oil to the extent of at least 1% by weight. Other compounds suitable are zinc dibutyl dithiocarbamate, zinc methyl octyl dithiocarbamate, zinc diamyl thiocarbamate, zinc dicetyl dithiocarbamate, and calcium, zinc, cadmium and tin petroleum base dithiocarbamates produced according to U.S. 2,363,012. These compounds act as antioxidants in amounts as small as 0.1% and preferred concentrations are in the range of 0.4-1%. Generally, some degree of heating is desirable during incorporation to hasten solution or dispersion of the inhibitor. The polyvalent metal dithiocarbamates are much more potent than the monovalent metal salts. For example, lead dibutyl dithiocarbamate gave an inhibition period of over 648 hours in comparison to 150 hours for sodium dibutyl dithiocarbamate.

A typical lithium base grease prepared according to the disclosure comprises 15 parts lithium stearate, 2.5 parts of a mineral oil concentrate consisting of 80% low V.I. naphthenic lubricating oil and 20% zinc petroleum base dithiocarbamate, and 82.5 parts of the same oil as used in the concentrate. The lithium stearate was mixed at room temperature with the oil and the mixture was then heated to about 410°F., the heated mixture being a uniform liquid. The concentrate of zinc petroleum base dithiocarbamate was then added and mixed in to assure homogeneity. The mixture was then drawn from the kettle and allowed to cool (U.S. 2,504,672).

REVERSIBLE GREASES—Water-resistant, transparent, mechanically and thermally stable reversible lubricating greases suitable for "lubricated for life" bearings, and particularly grease compositions which can be heated to above their melting point and cooled without loss of the grease structure, have been described by Standard Oil Development Co. One trouble-

some problem which has presented itself in the art is the lubrication of bearings operated at temperatures in the neighborhood of the boiling point of water and often above, as well as bearings operated at 140-200° F. in presence of water. Usually, greases for such service are either dispersions of soaps in a mineral lubrication oil of 60 seconds Saybolt viscosity at 100° F. to about 4,500 seconds Saybolt and the soaps are usually alkaline metal soaps, alkaline earth soaps or mixtures of these. Occasionally aluminum soaps are used. Above 140° F., calcium base greases are used but these generally require incorporation of a small amount of water to secure the grease-like structure and, when temperatures of around 212° F. are obtained, the water evaporates, leaving the lime soap, which is insoluble in the oil and which precipitates out.

In the present instance, a barium soap of excellent structure is claimed to be obtained by avoiding introduction of barium carbonate when barium oxide or hydroxide is used as a saponifying agent, and formation of the soap or saponification of fatty material directly in the mineral oil which is to serve as the liquid lubricating element of the finished grease composition. The use of preformed soap has been found unsatisfactory. The preparation of a neutral or slightly acid barium soap grease is another distinctive aspect of this development.

An example of a typical composition is given as follows:

10% by weight commercial oleic acid

8.07% barium-hydroxide-oil mixture (containing 33 1/3% water, 33 1/3% calcined barium oxide, 33 1/3% low cold test naphthenic type oil), and

81.93% of a low cold test coastal type lubricating oil. The oleic acid and the homogenous emulsion of barium hydroxide and oil are added together with about 1/3 of the lubricating oil. The mixture is then heated for a short time at 200° F., while stirring, and the remainder of the oil is added. The product is next allowed to cool substantially to room temperature where it sets up as a smooth cup grease and is later reheated to about 300° F. until all water is driven off. The grease is then poured into the containers and permitted to cool. Such a finished grease is transparent and smooth, has a melting point of 240° F., a penetration of 320-340 at 77° F. and may be alternately melted and cooled without loss of structure. Calcined barium oxide has been found much more active than commercial barium oxide, presumably because of the perceptible quantities of barium carbonate in the latter. It appears desirable to use an excess of water in hydrating. In general, the barium soaps comprise about 15-35% by weight of the greases and the addition of a small amount of aluminum soap such as aluminum stearate tends to give a smoother and more homogeneous product. About 0.2-4% by weight is all that is required (U.S. 2,504,717).

HIGH V.I. GREASES—Various polymeric materials have been added to lubricating greases to increase their viscosity index. Among the newer materials used for this purpose is a copolymer of isobutylene and styrene prepared by polymerization of the mixture at low temperatures. Such cycalkene copolymers have been called stybutene and, according to a patent issued to Standard Oil Development Co., they are particularly desirable additives for improving viscosity, tackiness and related characteristics. Copolymers of this type, particularly those having an intrinsic viscosity above 0.5 are superior to polybutene of similar molecular weight in that they are soluble in or at least compatible with fatty oils and do not precipitate out of mineral oil when fatty constituents are added. Hence such stybutene-containing greases are claimed to be more stable in physical structure.

The greases prepared according to the present invention are preferably compounded by dissolving a fat or fatty acid, such as hydrogenated fish oil acids, oleic acid, stearic acid, etc., or various polymerized fatty oils in a lubricating oil solution containing the stybutene in appropriate quantities. Generally the amount of copolymer will vary from 0.1-10% by weight, based on the total composition, although the preferred range is between 0.5-3%.

A grease composition prepared according to this disclosure contains 12.2% hydrogenated fish oil, 2.1% caustic soda, 0.4% glycerin, 84.3% blended mineral lubricating oil and 1% copolymer comprising 50% styrene and having an intrinsic viscosity of 0.9. The fish oil is first dissolved in 90% of the total amount of mineral oil, with heat and stirring, then the caustic soda is added and the mixture is heated to about 400° F. until saponification is completed. Then there is added the last 10% of the mineral lubricating oil containing the previously dissolved copolymer. As the mixture starts to cool, the glycerine is added with stirring, and the composition is allowed to cool to room temperature (U.S. 2,504,779).

IMPROVED ROSIN SOAP GREASES—In the preparation of rosin soap greases, the usual practice is to saponify so-called rosin oils which are viscous distillate oils obtained in the destructive distillation of rosin. Heretofore, it has been the practice in the preparation of soda soap greases, particularly the so-called sett greases, to saponify a mixture of oil and petroleum oil of suitable viscosity with a saponifying agent such as calcium oxide or slaked lime under conditions to produce a grease having the desired characteristics. One patent recently issued to Standard Oil Co. of Indiana, claims to produce a superior rosin soap grease by employing mixtures of rosin and hydrogenated or dehydrogenated rosin. Mixtures of hydrogenated and dehydrogenated rosins can be prepared by heating rosin with small amounts of active sulfur compounds such as sulfurized mineral oil by disproportionating the rosin in a manner such as that disclosed in U.S. patent 2,463,822. For any particular grease product, the ratio of rosin to hydrogenated and or dehydrogenated rosin required is best determined by trial. However, it has been found that a larger proportion of rosin may be used with dehydrogenated rosin than with hydrogenated rosin for a given setting time and penetration.

In this particular case, the invention is claimed to be adaptable to the production of sett greases which are mixtures of calcium soaps of rosin acids and various grades of mineral lubricating oils. Sett greases, which usually contain 5-25% calcium rosin soap, are generally employed for lubrication of rough heavy bearings operating at low speed and are used extensively in the logging industry where a relatively cheap grease is required for the lubrication of skidways.

One method of applying the invention to the preparation of such greases in which a mixture of rosin and dehydrogenated rosin is employed involves heating a mixture of 16.67 parts dehydrogenated rosin, 33.33 parts K rosin and 50 parts of mineral oil of 80 seconds Saybolt Universal viscosity at 100°F. in a steam heated kettle to about 180-200° F. until the rosins are dissolved. A grease prepared from about 15% of the rosin oil thus formed, 75% mineral oil, 7% water and

3% calcium hydrate, gels in about 20-40 seconds and has an unworked penetration of 150-170 mm at 77° F.

The grease is prepared by diluting the 15 parts of rosin oil with about 50 parts of the mineral oil. The remaining 25 parts of mineral oil are made into a smooth paste by stirring with 3 parts of calcium hydrate and 7 parts water. The rosin oil solution is then continuously mixed at about 90-110° F. with the lime slurry, agitated thoroughly for 10-15 seconds and immediately filled into the cans.

The advantage of using a mixture of rosin and dehydrogenated or hydrogenated rosin for production of rosin soap greases is illustrated by the following data showing the relative setting times and penetrations of 2 greases, (A) prepared from rosin oil obtained by heating a mixture of rosin and a mineral oil at about 500° F. for 44 hours and (B) prepared from rosin oil obtained by dissolving a mixture of one part of dehydrogenated rosin and two parts rosin in mineral oil at 180-210° F., each grease being prepared to the same 77° F. penetration:

Grease	Per Cent Soap	Per Cent Total Rosins Acids Used in the Rosin Oil	Setting Time (secs.)	77° Penetration
A	7.9	65	55	165
B	7.9	50	32.5	165

These data demonstrate that the technique makes it possible to prepare greases with the same penetration as previously made greases at the same soap content but requiring considerably less total rosin acids and having a substantially lower sett or gelling time (U.S. 2,505,222).

GREASE PLANT AND PACKAGING CENTER—Hightower has described the 7.5 acre plant of Standard Oil of California, which is claimed to be the most modern grease plant and packaging installation in the country (Chem. Eng. 4/50 p.116).

NEW GREASE FITTING—Lincoln Engineering Co. of St. Louis has developed a new all-purpose grease fitting of particular interest to textile mills and designed to seal dirt and lint out and keep the grease in (Textile World 5/50 p. 120).

SHELL'S ALVANIA GREASE—Shell Oil Co. is now advertising its Alvania "million stroke" industrial grease for servicing all grease applications in the majority of plants. It is claimed to be a grease that will stand at least 1 million punishing strokes of the ASTM work tester (Textile World 5/50 p.204).

STEAM POWER PLANT AUXILIARIES—The use of greases for lubrication of steam power plant auxiliaries is discussed in the April, 1950, issue of LUBRICATION.

PORTABLE GREASE GUN—A new portable grease gun having a self-contained electric unit for developing 500-12,000 psi nozzle pressure is being marketed by Brown Grease Gun Co. (Nat'l Petr. News 4/19 p.33).

ONE HAND GREASE GUN—Nat'l. Sales, Inc., is introducing a new 1-man, 1-hand high pressure grease gun which fits on the original 25-60 lb. grease container and employs no air or electrical connection, but a hydraulic booster developing up to 8,000 psi (Nat'l. Petr. News 4/19 p.36).

LITHIUM BASE GREASE—A lithium base lubricating grease having an improved texture and oxidation stability and capable of continued operation under high shearing stress with negligible change in structure or consistency is claimed in a recent application of Texaco Development Corp. The grease is prepared by mixing a homogeneous vehicle and a lithium soap of a soap-forming hydroxy fatty or glyceride, together with an oxidation inhibitor. The lithium soap is prepared by saponifying an acid such as 12-hydroxystearic acid with a basic lithium salt at a temperature below 300° F., dehydrating the reaction product at 270-330° F. and adding the oleaginous vehicle to obtain the desired consistency. Phenyl-alpha-naphthylamine may be added as an oxidation inhibitor (New Zealand Appl. 92,086-9).

PATENTS AND APPLICATIONS

N. Z. Appl.—97,679 (Tecalemit, Ltd.)—Grease gun.

Brit. Pat.—637,399 (Newman *et al*)—Apparatus for separating grease, oils and fats from waste water.

Brit. Pat.—637,422 (Shell Refining & Marketing Co.)—Manufacture of lubricating greases.

ABOUT THE COVER

(*Continued from Page 8*)

This apparatus has been found practical for the routine measurement of surface area in control laboratories where facilities for precision measurements are otherwise quite limited, and it can be operated after a short training period by ordinary laboratory technicians at a rate of about four samples per day.

The basis for the determination is a measurement of the amount of gas adsorbed by a sample kept at liquid nitrogen temperature at various increasing pressures of the adsorbing gas. A plot of the amount of gas adsorbed versus the pressure of gas is called the adsorption isotherm. The Branauer-Emmet-Teller theory makes possible the selection of a point on this isotherm which corresponds to the amount of gas which would be required just to cover the entire surface with a layer of gas one molecule thick. From this amount of gas, and a knowledge of the area covered by a single molecule of the gas, it is possible to calculate the total surface. The Harkins-Jura theory makes possible the direct calculation of the surface area without regard to the area covered by a single molecule. Once the surface is known, it is possible to calculate the average particle size (for non-porous) materials, from simple geometrical considerations.

NATIONAL SALES, INC. ANNOUNCES IMPROVED GRE-ZER-ATOR

The National Sales, Inc., Wichita, Kansas, announces the improved Gre-Zer-Ator which will open new avenues of profit to many dealers. The Gre-Zer-Ator is the first one-man, one-hand high-pressure grease gun that fits on the original 25- to 50-pound grease container which the dealer uses or sells to his customers. The Gre-Zer-Ator uses no air or electrical connection, yet this simple hydraulic booster easily develops up to 8,000 pounds pressure, and single priming will service about 200 connections.

Features of the Gre-Zer-Ator are: No bleeder valve needed; continuous flow of lubricant by spring pressure; no tools needed for assembly or use; two-piece steel pressure booster, easy to clean or repair; new cam lock on cover offers safe, quick method of installing pump; enlarged pump assembly and foot valve assures a greater supply of heavier greases; automotive poppet-type foot valve stops unnecessary pump charging caused by leakage.

Farmers and users of heavy industrial equipment find the Gre-Zer-Ator invaluable for servicing tractors, implement earthmoving equipment and stationary machinery because it allows a professional job to be done anywhere. The Gre-Zer-Ator was especially designed to promote oil and grease sales, and is available from all refiners, compounders, or their distributors, dealers and agents.

Bibliography On Petroleum Products

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PETROLEUM (General)

American Petroleum Institute, "Petroleum Bibliography", The Institute, Department of Public Relations (New York), 1934

American Petroleum Institute, "Petroleum: The Story of An American Industry", The Institute (New York), 1949

Ball, M. W., "This Fascinating Oil Business", Bobbs-Merrill Company (Indianapolis), 1940

Botsford, H., "Valley of Oil", Hastings House (New York), 1946

Brame, J. S. S. and King, J. G., "Fuel: Solid, Liquid, and Gaseous", Fourth Edition, Longmans, Green and Company, Inc. (New York), 1935

Brooks, B. T., "Peace, Plenty, and Petroleum", Cattell and Company, Inc. (Lancaster, Pennsylvania), 1944

Crowther, J. G., "About Petroleum", Oxford University Press (New York), 1938

DeGolyer, E. L. (Editor), "Elements of the Petroleum Industry", American Institute of Mining and Metallurgical Engineers (New York), 1940

DeGolyer, E. L. and Vance, H. J., "Bibliography on the Petroleum Industry", Agricultural and Mechanical College of Texas (College Station, Texas), 1946

Dunstan, A. E. (Editor), "Petroleum Industry", D. Van Nostrand Company, Inc. (New York), 1922

Egloff, G., "Earth Oil", The Williams and Wilkins Company (Baltimore), 1933

Fanning, L. M. (Editor), "Our Oil Resources", McGraw Hill Book Company, Inc. (New York), 1945

Fanning, L. M., "Rise of American Oil", Harper and Brothers (New York), 1948

Floherty, J. J., "Flowing Gold", J. B. Lippincott Company (Philadelphia), 1945

Frankel, P. H., "Essentials of Petroleum" Chapman and Hall, Ltd. (London), 1946

Fuchs, W. M., "When the Oil Wells Run Dry", Industrial Research Service ((Dover, New Hampshire), 1946

Giddens, P. H., "Birth of the Oil Industry", The Macmillan Company (New York), 1938

Goldstein, R. F., "Petroleum Chemicals Industry", E. and F. N. Spon, Ltd. (London), 1949

Hager, D., "Fundamentals of the Petroleum Industry", McGraw Hill Book Company, Inc. (New York), 1939

Hardwicke, R. E., "Petroleum and Natural Gas Bibliography", University of Texas (Austin, Texas), 1937

Hoyt, M. E., "Petroleum", Second Edition, Colorado School of Mines (Golden, Colorado), 1932

Institution of Petroleum Technologists, "Petroleum, Twenty-Five Years Retrospect, 1910-1935", The Institution (London), 1935

Jackson, A. and D. E., "Wonders of Oil", Dodd, Mead and Company, Inc. (New York), 1940

Kalichevsky, V. A., "Amazing Petroleum Industry", Reinhold Publishing Corporation (New York), 1943

Kewley, J., "Petroleum and Allied Industries", D. Van Nostrand Company, Inc. (New York), 1922

Leven, D. D., "Done in Oil", Ranger Press (New York), 1941

Leven, D. D., "Petroleum Encyclopedia", Ryerson Press (Toronto), 1942

Look Magazine, "Oil for Victory", McGraw Hill Book Company, Inc. (New York), 1947

National Petroleum News (Periodical), "Selected Articles on Wartime and Postwar Petroleum Products" (Reprinted February, 1945, from the wartime issues of Technical section, *National Petroleum News*), National Petroleum Publishing Company (Cleveland), 1945

Perry, J., "Petroleum Industry", Longmans, Green and Company, Inc. (New York), 1946

Pratt, W. E., "Oil in the Earth", University of Kansas (Lawrence, Kansas), 1942

Redwood, B., "Petroleum", 3 Volumes, Fourth Edition, J. B. Lippincott Company (Philadelphia), 1922

Roberts, W. J., "Story of Oil", Loyd Cole (London), 1943

Silliman, B., "First Scientific Analysis of Petroleum", P. H. Giddens (Meadville, Pennsylvania), 1949

Van Tuyl, F. M. and Parker, B. H., "Time of Origin and Accumulation of Petroleum", Colorado School of Mines (Golden, Colorado), 1941

Weaver, R. B., "Men and Oil", University of Chicago Press (Chicago), 1938

PETROLEUM STATISTICS

American Petroleum Institute, "Petroleum Facts and Figures", Eighth Edition (New York), 1947

American Petroleum Institute, "Petroleum-Industry Record, 1918-1948", Oil Industry Information Committee (New York), 1949

DeGolyer, E. and MacNaughton, L. W., "Twentieth Century Petroleum Statistics, 1949", The Authors (Dallas, Texas), 1949

National Industrial Conference Board, "Petroleum Almanac, 1946", The Author (New York), 1946

Osborne, B. A., "Index to American Petroleum Statistics", Special Libraries Association (New York), 1943

Petroleum World (Periodical), "Annual Review, 1949", The Periodical (Los Angeles), 1949

Skinner, W. E., "Oil and Petroleum Yearbook, 1949", Walter E. Skinner, Ltd. (London), 1949

Struth, H. J. (Editor) "The Petroleum Data Book", First Edition, The Petroleum Engineer Publishing Company (Dallas), 1947

Struth, H. J. (Editor), "The Petroleum Data Book", Second Edition, The Petroleum Engineer Publishing Company (Dallas), 1948

World Power Conference, "Statistical Yearbook of the Conference, Data on Resources and Annual Statistics for 1936-1946", World Power Conference (London), 1948

PETROLEUM CHEMISTRY AND REFINING

Bell, H. S., "American Petroleum Refining", Third Edition, D. Van Nostrand Company, Inc. (New York), 1945

Berkman, S., Morrell, J. C., and Egloff, G., "Catalysis, Inorganic and Organic", Reinhold Publishing Corporation (New York), 1940

Burk, R. E., et al. "Polymerization and Its Applications in the Fields of Rubber, Synthetic Resins, and Petroleum", Reinhold Publishing Corporation (New York), 1937

Crain, H. M. (Editor), "Petroleum Refining", Colorado School of Mines (Golden, Colorado), 1950

Defize, J. C. L., "On the Edeleanu Process for the Selective Extraction of Mineral Oils", Nordeman Publishing Company, Inc. (New York), 1938

Dunstan, A. E., "Chemistry and the Petroleum Industry", Institute of Chemistry of Great Britain and Ireland (London), 1942

Dunstan, A. E. et al (Editors), "Science of Petroleum", 4 Volumes, Oxford University Press (New York), 1938

Egloff, G., "The Reactions of Pure Hydrocarbons", Reinhold Publishing Corporation (New York), 1937

Egloff, G., "Physical Constants of Hydrocarbons", 4 Volumes, Reinhold Publishing Company(New York), 1939-1947

Egloff, G., et al, "Isomerization of Pure Hydrocarbons", Reinhold Publishing Company (New York), 1942

Egloff, G. and Hulla, G., "Alkylation of Alkanes", 3 Volumes, Reinhold Publishing Corporation (New York), 1948

Ellis, C., "Chemistry of Petroleum Derivatives", 2 Volumes, Reinhold Publishing Corporation (New York), 1934-1937

Foster, A. L., et al, "Petroleum Cracking and Refining", International Textbook Company (Scranton, Pennsylvania), 1942

Gauger, A. W., "Physical Chemistry and the Technology of Fuels", Phi Lambda Upsilon (State College, Pennsylvania), 1947

Gruse, W. A. and Stevens, D. R., "Chemical Technology of Petroleum", Second Edition, McGraw Hill Book Company, Inc. (New York), 1942

Gurwitsch, L. G. and Moore, H., "Scientific Principles of Petroleum Technology", D. Van Nostrand Company, Inc. (New York), 1932

Himus, G. W., "Elements of Fuel Technology", Leonard Hill, Ltd. (London), 1947

Institute of Petroleum, "Annual Reviews of Petroleum Technology, 1937-1940", 4 Volumes, The Institute (London), 1938-1941

Institute of Petroleum, "Modern Petroleum Technology", The Institute (London), 1946

Institute of Petroleum, "Reviews of Petroleum Technology (1941-1945)", The Institute (London), 1947

Institute of Petroleum, "Reviews of Petroleum Technology (1946)", The Institute (London), 1949

Institution of Petroleum Technologists, "Petroleum Technology, 1935-1936", 2 Volumes, The Institution (London), 1936-1937

Japour, M. J., "Petroleum Refining and Manufacturing Process", Wetzel Publishing Company, Inc. (Los Angeles), 1939

Kalichevsky, V. A., "Modern Methods of Refining Lubricating Oils", Reinhold Publishing Corporation (New York), 1938

Kalichevsky, V. A. and Stagner, B. A., "Chemical Refining of Petroleum", Reinhold Publishing Corporation (New York), 1942

McKnight, D., "Study of Patents on Petroleum Cracking", University of Texas (Austin, Texas), 1938

National Petroleum News (Periodical), "Refresher on Wartime Refining Technology", National Petroleum Publishing Company (Cleveland), 1945

Nelson, W. L., "Petroleum Refinery Engineering", Third Edition, McGraw Hill Book Company, Inc. (New York), 1949

Petroleum Educational Institute, "Simplified Petroleum Chemistry and Physics", The Institute (Los Angeles), 1943

Phillips Petroleum Company, "Hydrofluoric Acid Alkylation", The Company (Bartlesville, Oklahoma), 1946

Sachanen, A. N., "Chemical Constituents of Petroleum", Reinhold Publishing Corporation (New York), 1945

Sachanen, A. N., "Conversion of Petroleum", Second Edition, Reinhold Publishing Corporation (New York), 1948

Sachanen, A. N. and Tilicheev, M. D., "Chemistry and Technology of Cracking", Chemical Catalog Company, Inc. (New York), 1932

Stephens, M. M., "Petroleum Refining", Volumes II and III, Pennsylvania State College (State College, Pennsylvania), 1939-1941

Stephens, M. M. and Spencer, O. F., "Petroleum Refining", Volume II, Second Edition, Pennsylvania State College (State College, Pennsylvania), 1948

Waverly Oil Works Company, "Waverly Petroleum Handbook", Eleventh Edition, The Company (Pittsburgh), 1949

Weil, B. H. and Lane, J. C., "Synthetic Petroleum from the Synthine Process", Chemical Publishing Company, Inc. (Brooklyn), 1948

Zaba, J. and Doherty, W. T., "Practical Petroleum Engineers' Handbook", Third Edition, The Gulf Publishing Company (Houston, Texas), 1949

PETROLEUM TESTS

Altieri, V. J., "Gas Chemists' Book of Standards for Light Oils and Light Oil Products", American Gas Association, Inc. (New York), 1943

American Society for Testing Materials, "Evaluation of Petroleum Products", The Society (Philadelphia), 1940

American Society for Testing Materials, "Significance of Tests of Petroleum Products", The Society (Philadelphia), 1948

American Society for Testing Materials, "A.S.T.M. Manual of Engine Test Methods for Rating Fuels", The Society (Philadelphia), 1948

American Society for Testing Materials, "A.S.T.M. Standards on Petroleum Products and Lubricants", The Society ((Philadelphia), 1949

Ashworth, A. A., "Analysis of Oil for the Production of Lubricants", Ernest Benn, Ltd. (London), 1933

Callen, A. S. and Ulmann, A., "Fuel Testing and Power Economics", International Textbook Company (Scranton, Pennsylvania), 1933

Chandler, J. S., "Ignition-Quality Rating of Diesel Fuels by Commercial Engines", Pennsylvania State College (State College, Pennsylvania), 1939

Clower, J. L., "Lubricating Oil Tests", McGraw Hill Book Company, Inc. (New York), 1939

Coordinating Research Council, "CFR Handbook", The Council (New York), 1949

Engelder, C. J., "Laboratory Manual of Gas, Oil and Fuel Analysis", John Wiley and Sons, Inc. (New York), 1931

Hetzel, T. B., "Developments of Diesel Fuel Testing", Pennsylvania State College (State College, Pennsylvania), 1936

Himus, G. W., "Fuel Testing", Second Edition, Leonard Hill, Ltd. (London), 1942

Huntress, E. H. and Mulliken, P., "Identification of Pure Organic Compounds", John Wiley and Sons, Inc. (New York), 1941

Institute of Petroleum, "Standard Methods for Testing Petroleum and Its Products", Tenth Edition, The Institute (London), 1949

Latta, J. E. and Kauffman, H. L., "Petroleum Distillation and Testing," International Textbook Company (Scranton, Pennsylvania), 1939

Parr, S. W., "Analysis of Fuel, Gas, Water and Lubricants", Fourth Edition, McGraw Hill Book Company, Inc. (New York), 1932

Snell, F. D. and Biffin, F. M., "Commercial Methods of Analysis", McGraw Hill Book Company, Inc. (New York), 1944

Southcombe, J. E., "Lubricating Oil Tests and Their Significance", Sixth Edition, Germ Lubricants, Ltd. (London), 1940

U. S. Government, "Federal Specifications for Lubricants and Liquid Fuels; General Specifications (Methods for Sampling and Testing)", Federal Standard Stock Catalog, Section IV, Part 5, Government Printing Office (Washington), (Revised from time to time)

Universal Oil Products Company, "U.O.P. Laboratory Test Methods for Petroleum and Its Products", Third Edition, The Company (Chicago), 1947

ASPHALTS

Abraham, H., "Asphalts and Allied Substances", 2 Volumes, Fifth Edition, D. Van Nostrand Company, Inc. (New York), 1945

Asphalt Institute, "Asphalt", The Institute (New York), 1943

Cross, R., "Handbook of Petroleum, Asphalt and Natural Gas", Kansas City Testing Laboratory (Kansas City, Missouri), 1931

Forbes, R. J., "Bitumen and Petroleum in Antiquity", E. J. Brill, Publisher (Leiden, Netherlands), 1936

Gaetz, H. T., "Water-White Hydrocarbons from Trinidad Asphalt", Reinhold Publishing Corporation (New York), 1937

Garner, F. H. (Editor), "Modern Road Emulsions", Carriers Publishing Company, Ltd. (London), 1933

Hosberg, A. J., et al., "Properties and Composition of Asphalts of the Slow Curing Type", University of Wisconsin Press (Madison, Wisconsin), 1939

Hubbard, P., "Development of the Asphalt Industry in the United States", Asphalt Association (New York), 1928

Reiner, M., "Research on the Rheological Properties of Bitumen and Asphalt", Interscience Publishers, Inc. (New York), 1949

CUTTING OILS

Bastian, E. L. H., "Composition, Control and Selection of Coolants for Working Metals" (Reprint), Shell Oil Company, Inc. (New York), 1947

Cities Service Oil Company, "Metal Cutting Fluids", The Company (New York)

Crowley, C. A. (Editor), "Cutting Oils and How to Use Them", Technical Service Bureau, Inc. (Chicago), 1946

Forbes, W. G., "Lubricants and Cutting Oils for Machine Tools", John Wiley and Sons, Inc. (New York), 1943

Gulf Oil Corporation, "Gulf Cutting Oils for Increased Production and Longer Tool Life", The Company (Pittsburgh), 1942

Schwartz, L., "Dermatitis from Cutting Oils", U. S. Public Health Service Reprint No. 2321, Government Printing Office (Washington), 1941

Texas Company, "Lubricants and Coolants for Cutting and Grinding", The Company (New York), 1944

FUEL OILS

American Society of Mechanical Engineers, "Diesel Fuel Oils", The Society (New York), 1948

American Society for Testing Materials, "Symposium on Industrial Fuels", The Society (Philadelphia), 1936

American Society for Testing Materials, "Forum on Diesel Fuel Oils", The Society (Philadelphia), 1947

Carr, A. R. and Selheimer, C. W., "Fuels and Their Utilization", Pitman Publishing Corporation (New York), 1940

Education Sub-Committee of the Fuel Efficiency Committee of the Ministry of Fuel and Power, "Efficient Use of Fuel", Chemical Publishing Company, Inc. (Brooklyn), 1945

Griswold, J., "Fuels, Combustion and Furnaces", McGraw Hill Book Company, Inc. (New York), 1946

Haslam, R. T. and Russell, R. P., "Fuels and Their Combustion", McGraw Hill Book Company, Inc. (New York), 1926

Kratz, A. P., et al, "Combustion Efficiencies as Related to Performance of Domestic Heating Plants", University of Illinois Press (Urbana, Illinois), 1942

Moore, H., "Liquid Fuels, Their Manufacture, Properties, Utilization and Analysis", D. Van Nostrand Company, Inc (New York), 1937

Sinclair Refining Company, "Diesel Engines—Fuels and Lubricants", The Company (New York), 1949

Steiner, K., "Fuels and Fuel Burners", McGraw Hill Book Company, Inc (New York), 1946

Vanderdoes, J., et al, "Combustion Engine Fuels and Heat", International Textbook Company (Scranton, Pennsylvania), 1935

GASOLINE

American Society for Testing Materials, "Gasoline—Past, Present and Future", The Society (Philadelphia), 1942

American Society for Testing Materials, "Forum on Tractor Fuels", The Society (Philadelphia), 1948

Borger, E. L., "Tractor Fuels", Kansas State College (Manhattan, Kansas), 1939

Boyd, T. A., "Gasoline", Frederick A. Stokes Company (Philadelphia), 1925

Brown, G. G., et al, "Natural Gasoline and the Volatile Hydrocarbons", Natural Gasoline Association of America (Tulsa, Oklahoma), 1948

Bureau of Mines, "Abstracts of Synthetic Liquid Fuels, October 1944-December 1947", 4 Volumes, Hobart Publishing Company (Washington), 1948

Bureau of Mines, "Synthetic Liquid Fuels Abstracts, Volume 1-3 (New Series), The Bureau (Pittsburgh), 1948-1950

Ellis, C. and Meigs, J. V., "Gasoline and Other Motor Fuels", D. Van Nostrand Company, Inc. (New York), 1926

Leslie, E. H., "Motor Fuels, Their Production and Technology", Chemical Catalog Company (New York), 1923

Nash, A. W. and Howes, D. A., "Principles of Motor Fuel Preparation and Application", 2 Volumes, Second Edition, John Wiley and Sons, Inc. (New York), 1938-1939

Paustian, R. G., "Road Tests of Automobiles Using Alcohol-Gasoline Fuels", Iowa State College Press (Ames, Iowa), 1942

Van Winkle, M., "Aviation Gasoline Manufacture", McGraw Hill Book Company, Inc. (New York), 1944

GREASES

American Society for Testing Materials, "Symposium on Functional Tests for Ball Bearing Greases", The Society (Philadelphia), 1949

Chittick, M. B., "Rationalization of Lubricating Greases", (*Institute Spokesman* 5, Nos. 3-8), National Lubricating Institute (Kansas City), 1941

Clower, J. L., "American Lubricating Greases", (*Bulletin of Virginia Polytechnic Institute* 29, No. 1) Blacksburg, Virginia), 1935

Klemgard, E. N., "Lubricating Greases, Their Manufacture and use", Reinhold Publishing Corporation (New York), 1937

National Lubricating Grease Institute, "*Institute Spokesman*", Index to technical papers on greases published from March 1937 to March 1946, was distributed with the January 1947 issue, other indexes covering the period April 1946 to March 1950 appear annually in the March issue.

Sinclair Refining Company, "Lubricating Greases", The Company (New York), 1944

LUBRICANTS AND LUBRICATION

Adam, N. K., "Physics and Chemistry of Surfaces", Second Edition, Oxford University Press (New York), 1938

American Society of Lubrication Engineers, "Physical Properties of Lubricants", The Society (Chicago), 1949

American Society of Mechanical Engineers, "Diesel Lubricating Oils and Basic Principles of Lubrication", The Society (New York), 1949

American Society for Testing Materials, "Symposium on Motor Lubricants", The Society (Philadelphia), 1933

American Society for Testing Materials, "Symposium on Lubricants (1937)", The Society (Philadelphia), 1937

American Society for Testing Materials, "Conversion Tables for Kinematic and Saybolt Universal Viscosities", The Society (Philadelphia), 1943

American Society for Testing Materials, "Symposium on Oil Procurement Practices", The Society (Philadelphia), 1947

American Society for Testing Materials, "Symposium on Synthetic Lubricants", The Society (Philadelphia), 1947

American Society for Testing Materials, "Petroleum Products as Related to Automotive Equipment", The Society (Philadelphia), 1948

American Society for Testing Materials, "Symposium on Industrial Gear Lubricants", The Society (Philadelphia), 1949

Archbutt, L. and Deeley, R. M., "Lubrication and Lubricants", Fifth Edition, J. B. Lippincott Company (Philadelphia), 1927

Bender, R. C., "Fluid Mechanics", Prentice Hall (New York), 1943

Berkman, S. and Egloff, G., "Emulsions and Foams", Reinhold Publishing Corporation (New York), 1941

Boswall, R. O., "Theory of Film Lubrication", Longmans, Green and Company, Inc. (New York), 1928

Burke, R. E. and Grummitt, O. J. (Editors), "Chemical Background for Engine Research", Interscience Publishers, Inc. (New York), 1943

Burwell, A. W., "Oiliness", Second Edition, Alox Chemical Corporation (Niagara Falls, New York), 1935

Chek-Chart Corporation, "Service Man's Guide to Automotive Lubrication", Seventh Edition, The Corporation (Chicago), 1944

Clower, J. L., "Lubricants and Lubrication", McGraw Hill Book Company, Inc. (New York), 1939

Evans, E. A., "Lubricating and Allied Oils", Third Edition, Chapman and Hall, Ltd. (London), 1945

Everett, H. A., "Internal Combustion Engine Lubrication Research at the Pennsylvania State College", Pennsylvania State College (State College, Pennsylvania), 1944

Everett, H. A. and Stewart, F. C., "Performance Tests of Lubricating Oils in Automobile Engines", Pennsylvania State College (State College, Pennsylvania), 1935

Everett, H. A. and Keller, G. H., "Laboratory Method for Evaluating the Influence of Lubricating Oils on Carbon Deposition in Internal-Combustion Engines", Pennsylvania State College (State College, Pennsylvania), 1939

Everett, H. A. and Keller, G. H., "Service Performance on Eight Lubricating Oils in Automobile Engines", Pennsylvania State College (State College, Pennsylvania), 1940

Forbes, W. G., "Lubrication of Industrial and Marine Machinery", John Wiley and Sons, Inc. (New York), 1943

Formanek, J., "Benzine and Mineral Lubricants: Their Production, Testing and Uses", D. Van Nostrand Company, Inc. (New York), 1946

Gulf Oil Corporation, "Lubrication of Automotive Diesel Engines", The Corporation (Pittsburgh), 1945

Hersey, M. D., "Theory of Lubrication", John Wiley and Sons, Inc. (New York), 1936

Hersey, M. D. and Hopkins, R. F., "Coordinated Data on Viscosity of Lubricants Under High Pressure", American Society of Mechanical Engineers, Special Research Committee on Lubrication (New York), 1946

Hund, W. J., et al. "Some Aspects of Industrial Lubrication" (Reprint), Shell Development Company (San Francisco), 1942

Institution of Mechanical Engineers, "Proceedings of the General Discussion on Lubricating and Lubricants, October 13-15, 1937", 2 Volumes, American Society of Mechanical Engineers (New York), 1938

Kraus, J., "Naphthenic Lubricants and Allied Products", Horizon House (New York), 1942

Marshall, L. K. and Jacobs, G. W., "The Trend Toward Lighter Oils", General Motors Corporation (Pontiac, Michigan-Flint, Michigan), 1934

Marx, G. H., et al, "Some Experiments on Oil Films in Complete Cylindrical Bearings", Stanford University Press (Stanford, California), 1932

Mason, C. J., "Marine Steam Turbines and Lubrication", International Textbook Company (Scranton, Pennsylvania), 1934

Molloy, E., (Editor), "Fuel and Oil Systems", Chemical Publishing Company, Inc. (Brooklyn), 1941

Nash, A. W. and Bowen, A. R., "Principles and Practice of Lubrication", Second Edition, Chemical Publishing Company of New York, Inc. (Brooklyn), 1937

Newell, A. B., "Diesel Lubrication", Diesel Publications, Inc. (New York), 1945

Norton, A. E., "Lubrication", McGraw Hill Book Company, Inc. (New York), 1942

Petroleum Educational Institute, "Additive Engine Oils", The Institute (Los Angeles), 1945

Petroleum Educational Institute, "Fundamentals and Application of Fuels and Lubricants", 25 Volumes, Third Edition, The Institute (Los Angeles), 1948

Pugh, B. and Court, J. M. A., "Fuels and Lubricating Oils for Internal Combustion Engines", Pitman Publishing Corporation (New York), 1949

Shell Oil Company, Inc., "Fundamentals of Lubrication and Lubricating Friction Type Bearings", (Volume I, Nos. 1 and 2 of Panorama of Lubrication Series), The Company (New York)

Shell Oil Company, Inc., "Fundamentals of Diesel Engine Lubrication", (Volume I, No. 4 of Panorama of Lubrication Series), The Company (New York)

Shell Oil Company, Inc., "Fundamentals of Automotive Engine Lubrication", (Volume I, No. 5 of Panorama of Lubrication Series), The Company (New York)

Shell Oil Company, Inc., "Fundamentals of Steam Engine Lubrication", (Volume I, No. 6 of Panorama of Lubrication Series), The Company (New York)

Shell Oil Company, Inc., "Significance of Tests and Specifications of Automotive Engine Lubricants", (Volume I, No. 7 of Panorama of Lubrication Series), The Company (New York)

Shell Oil Company, Inc., "Fundamentals of Aviation Engine Lubrication", (Volume I, No. 8 of Panorama of Lubrication Series), The Company (New York)

Shell Oil Company, Inc., "Marine Engine and Auxiliary Lubrication", (Volume II, No. 1 of Panorama of Lubrication Series), The Company (New York)

Sinclair Refining Company, "Aircraft Engine Lubrication", Second Edition, The Company, Aviation Sales Department (Chicago), 1944

Smith, P. H., "Diesel Engines, Excessive Lubricating Oil Consumption", Constable and Company, Ltd. (London), 1935

Standard Oil Development Company, Viscosity Indices—Calculated from Basic Kinematic Values", 4 Volumes (New York), 1939

Stewart-Warner Corporation, "Alemite Answers", The Company (Chicago), 1945

Sun Oil Company, "Lubrication of Refrigeration and Air Conditioning Equipment", The Company (Philadelphia)

Sun Oil Company, "Lubrication of Diesel Engines", Technical Bulletin No. B-1 (Revised), The Company (Philadelphia), 1946

Texas Company, "Marine Machinery Lubrication", The Company (New York), 1942

Texas Company, "Ball and Roller Bearing Lubrication", Third Edition, The Company (New York), 1944

Texas Company, "Diesel Operation, Fuel and Lubricants", The Company (New York), 1946

Texas Company, "Lubrication" (Monthly publication), The Company (New York)

Thomsen, J. C., "Practice of Lubrication", Third Edition, McGraw Hill Book Company, Inc. (New York), 1937

Tide Water Oil Company, "Modern Lubrication and Fuel Requirements for Diesel Engines", The Company (New York), 1933

Vanderdoes, J., et al, "Engine Auxiliaries, Lubrication, Testing", International Textbook Company (Scranton, Pennsylvania), 1935

Vanderdoes, J., et al, "Lubrication, Cooling Troubles and Remedies", International Textbook Company (Scranton, Pennsylvania), 1938

Wade, G. and Foster, A. L., "Relationship Between Volatility and Consumption of Lubricating Oils in Internal-Combustion Engines", Bureau of Mines Technical Paper 500, Government Printing Office (Washington), 1931

Webb, P. W. and Chittick, M. B., "Automobile Bearings and Lubrication", International Textbook Company (Scranton, Pennsylvania), 1939

Weiland, W. F., "Fuels and Lubricants Laboratory Manual", Burgess Publishing Company (Minneapolis), 1948

Wright, F. and Purday, H. F. P., "Diesel Engine Fuels and Lubricants", Constable and Company, Ltd. (London), 1950

Zamboni, G. A., "Motor Oils and Their Application", Educational Institute, Inc. (Los Angeles), 1936

Zuidema, H. H., "Oxidation of Lubricating Oils" (Reprint), Shell Oil Company (New York), 1946

(continued on Page 32)

FUTURE MEETINGS OF YOUR INDUSTRY

JUNE

4-7 American Gear Manufacturers Assn.
The Homestead, Hot Springs, Va.

4-9 Socy. of Automotive Engineers (summer meeting)
French Lick Springs Hotel, French Lick, Ind.

N. L. G. I.
GUIDE POST

(Continued)

SUPPLIERS OF EQUIPMENT FOR MANUFACTURING LUBRICATING GREASES

CONTAINER MANUFACTURERS

Future Meetings

(continued from Page 29)

12-16 American Socy. of Mechanical Engineers (oil and gas power division)
Lord Baltimore Hotel, Baltimore, Md.

12-16 American Socy. of Mechanical Engineers (4th national materials handling and exhibit)
International Amphitheater, Chicago, Ill.

18-20 Petroleum Equipment Suppliers Assn.
The Greenbrier, White Sulphur Springs, W. Va.

19-23 American Socy. of Mechanical Engineers
Hotel Statler, St. Louis, Mo.

22-24 American Socy. of Mechanical Engineers (applied mechanics)
Purdue University, Lafayette, Ind.

26-30 American PETROLEUM INSTITUTE (Division of Production, mid-year standardization committee conference)
Brown Palace Hotel, Denver Colo.

(Continued on Page 34)

It will be recalled that there was considerable discussion during the New Orleans meeting concerning the proposed NLGI Research Fellowship Program. The follow-up of those discussions has resulted in the organization of a Subcommittee under the chairmanship of Mr. L. W. McLennan. The other members of this Subcommittee are Mr. M. Ehrlich and Mr. Gus Kaufman. They are giving careful consideration to a number of questions such as should the problem selected be of the long range type and strictly fundamental, or should it have immediate practical or applied value? They have prepared a list of the fields which might be explored, as, for example, syneresis, rheology, phase rule studies, oxidation of greases, etc. In the near future, the Subcommittee members will approach various universities and colleges which might be interested in this fellowship. In other words, it is probable that this Subcommittee will be prepared to present a definite proposition to the Board and the Technical Committee before the next annual meeting in October.

Mr. H. M. Fraser, Chairman of the Subcommittee on Procurement of Technical Papers for Publication in THE INSTITUTE SPOKESMAN, has reorganized his group and the new members of the new subcommittee are Messrs. C. J. Boner, L. W. McLennan, F. S. Glauch, M. Ehrlich, M. Findlayson. They have reported that a number of interesting papers have been promised. However, they are also emphatic that they would be pleased to hear from any one who may have a paper in mind. They are prepared to offer assistance in the preparation of such papers in the form most suitable for THE INSTITUTE SPOKESMAN.

The NLGI Editorial Subcommittee is in the process of being reorganized. It is recognized that this group carries a rather heavy load. Each month they must review papers and articles that have to meet deadlines. Therefore, to spread the burden, it is planned to change the membership annually.

The Panel on Delivery Characteristics of Dispensing Equipment for Lubricating Greases, under the Chairmanship of Mr. E. C. Brunstrum, has work under way on two parts of their problem. One group is working on the write-up of a method for determining the delivery characteristics of grease guns of the type used in service stations, while the other group is investigating methods for the measurement of slumpability characteristics of greases.

This column must be prepared approximately one month ahead of publication. At this date the ABEC-NLGI Cooperative Committee on Grease Test Methods is finalizing arrangements to hold a meeting at ABEC Headquarters in New York City, on June 9. The tentative agenda includes subjects such as a discussion of means for avoiding difficulties caused by high pressure greasing equipment; methods for evaluating the lubricity characteristics of greases; review of the present status of the revised BEC Tester; discussion of the limits permissible for dirt count of greases used in specified applications; consideration of projects involving fretting corrosion, etc. The minutes of the ABEC-NLGI Cooperative Committee on Grease Test Methods meeting will be covered in the July or August issue of this column.

Bibliography on Petroleum Products

(continued from Page 28)

NAPHTHAS

Durrans, T. N., "Solvents", Second Edition, D. Van Nostrand (New York), 1931

Gulf Oil Corporation, "Industrial Petroleum Naphthas", The Company (Pittsburgh), 1943

Jordan, O., "Technology of Solvents", Second Edition, Leonard Hill Ltd. (London), 1940

Matiello, J. J., "Protective and Decorative Coatings", 5 Volumes, John Wiley and Sons, Inc. (New York), 1941-1946

Mellan, I., "Industrial Solvents", Reinhold Publishing Company (New York), 1939

Shell Oil Company, "Shell Industrial Naphthas", The Company (New York)

U. S. Government, "Protective and Decorative Coatings", Office of Quartermaster General, War Department (Washington), 1945

Universal Oil Products Company, "Naphtha Treating Pays Its Way", U.O.P. Booklet No. 250, The Company (Chicago), 1941

Weissberger, A. and Proskauer, E., "Organic Solvents", Oxford University Press (New York), 1935

WAXES

Bennett, H. (Editor), "Commercial Waxes", Chemical Publishing Company, Inc. (Brooklyn), 1944

Carbide and Carbon Chemicals Corporation, "Emulsions", Seventh Edition, The Corporation (New York), 1946

Espach, R. H., "Manufacture of Paraffin Wax from Petroleum", Bulletin 388, U. S. Bureau of Mines (Washington), 1935

Hilditch, T. P., "Industrial Chemistry of the Fats and Waxes", Second Edition, D. Van Nostrand Company, Inc. (New York), 1941

Pan American Union, "Oils and Waxes", The Union (Washington), 1938

Southeim, G. M., "Introduction to Emulsions", Chemical Publishing Company (New York), 1946

Warth, A. H., "Chemistry and Technology of Waxes", Reinhold Publishing Corporation (New York), 1947

White, E. L., "Wax", Doubleday and Company, Inc. (New York), 1935

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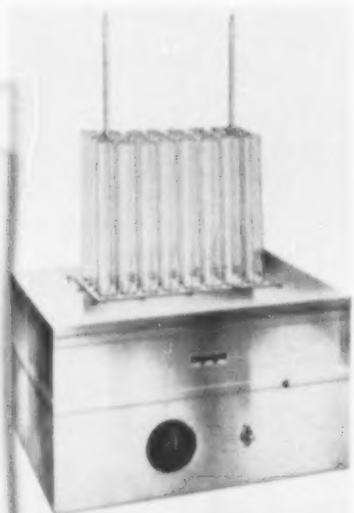

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Future Meetings

(continued from Page 31)

26-30 American Socy. for Testing Materials (annual meeting)
Chalfonte-Haddon Hall, Atlantic City, N. J.

AUGUST

14-16 Socy. of Automotive Engineers (west coast meeting)
Biltmore Hotel, Los Angeles, Calif.

SEPTEMBER

3-8 American Chemical Society
Chicago, Ill.

5-9 Sixth Annual Chemical Exposition
Coliseum, Chicago, Ill.

11-15 American Socy. of Mechanical Engineers (industrial instruments and regulators conference with the Instrument Socy. of America)
Municipal Auditorium, Buffalo, N. Y.

11-13 OIL INDUSTRY INFORMATION COMMITTEE
Hotel Traymore, Atlantic City, N. J.

12-14 Socy. of Automotive Engineers
Hotel Schroeder, Milwaukee, Wiss.

13-15 National Assn. of Motor Bus Operators (21st annual meeting)
Drake Hotel, Chicago, Ill.

13-15 National Petroleum Assn.
Hotel Traymore, Atlantic City, N. J.

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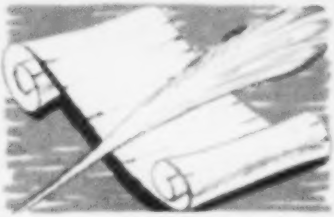

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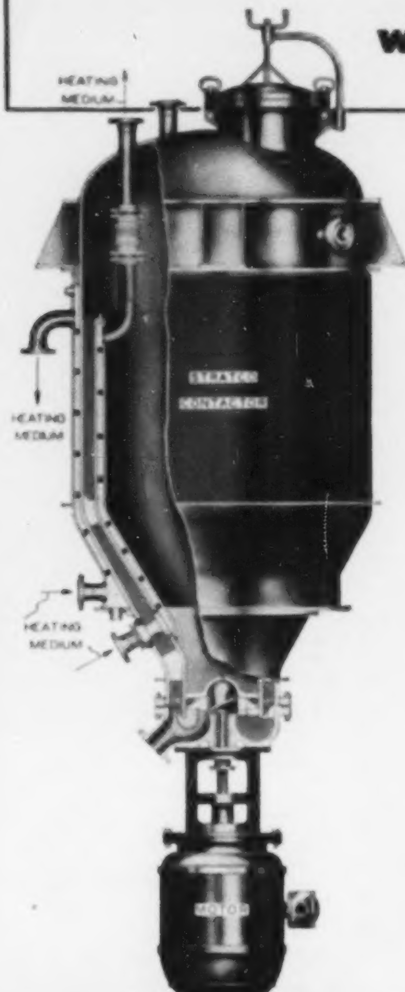

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